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ABSTRACT

This paper is the third of a series of three which attempt to integrate categories of description aimed at characterizing the experience of learning in terms of the logical relationships that exist between them. The description of the qualitatively different ways in which various aspects of reality are experienced and conceptualized, and the search for logical relations between the categories of description arrived at have been labelled phenomenography. Two different ways of experiencing a learning situation are described: deep approach and surface approach. In the former the learner is looking for relations between the parts of the text as well as between the text and that which its content can be linked to. He is experiencing himself as the active agent of learning; he is the one who does the learning. In the second way of experiencing learning, the surface approach, the learner is dealing with the parts in isolation and ascribes to himself a passive role in the learning process. The way of experiencing a learning situation is related to the learner's conception of learning. The conception of learning underlies both how learning is experienced (by the learner) and how it is described (by the researcher). (Author/PN)

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A b s t r a c t

As a starting point for describing the qualitatively different ways in which learning is experienced, the conception of learning underlying the description is made explicit. Two distinctively different conceptions of learning are accounted for. According to one, learning is the acquisition of a number of facts, definitions etc, according to the other, learning is a qualitative change in one's way of understanding some aspect of reality. It is the latter conceptualisation that forms the framework for describing the experience of learning.

Two different ways of experiencing a learning situation are described, one is labelled deep approach and the other surface approach. The former is characterised by the learner's attention being focussed on what the text is about, he is looking for relations between the parts of the text as well as between the text and that which its content can be linked to. He is experiencing himself as the active agent of learning, he is the one who does the learning. The second way of experiencing learning, called the surface approach is characterised by the learner's attention being focussed on the text itself. He is dealing with the parts in isolation and ascribes himself a passive role in the learning process.

It was found that the way of experiencing a learning situation is related to the learner's conception of learning. There are two qualitatively different conceptions found among learners and they turn out to correspond to the two conceptions found among researchers. The conception of learning is thus seen to underly both how learning is experienced (by the learner) and how it is described (by the researcher).

Foreword

As in the case of the first two papers in this series of three, the present one also aims at integrating categories of description in terms of which learning has been described.

The description of the qualitatively different ways in which various aspects of reality are experienced and conceptualised and the search for logical relations between the categories of description arrived at has been called phenomenography (Marton, 1981), thereof this term in the title. The endeavour to integrate categories of description corresponding to the different ways in which learning is experienced and conceptualised has by no means been completed during the two years this series of three reports has come about, thereof the preposition "towards".

This third report is very much a working paper, which may be of some interest to those who consider the whole undertaking as such, as a relatively meaningful project.

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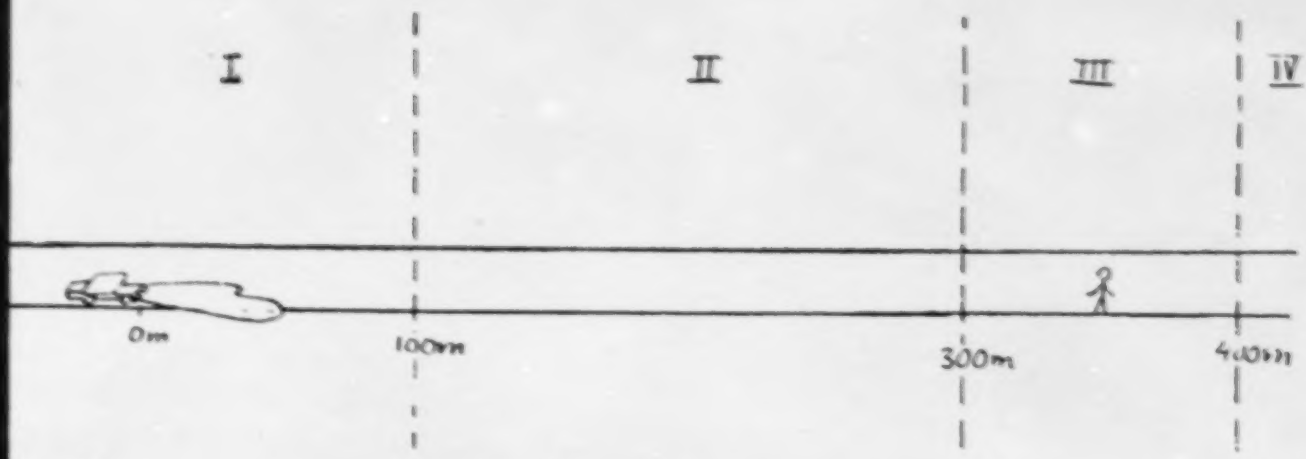
Mölndal, December 1982.

Ference Marton

Consider the following question:

On a clear, dark night, a car is parked on a straight, flat road. The car's headlight are on and dipped. A pedestrian standing on the road sees the car's lights. This is illustrated in the figure below, which is divided into four sections.



In which section is there light?

Give reasons for your answer.

The correct answer is, of course, that there is light in all the sections. Such an answer is based on what we may call the key idea of Optics, namely that light has a physical existence and it spreads in space, separate from sources and effects. According to a recent investigation by Andersson and Kärrqvist (1981) very few of the students in the final (9th) grade of the Swedish comprehensive school have grasped this principle. Now, the understanding of the existence and spread of light is a necessary prerequisite

for understanding the link between object and eyes, i.e. the first step in seeing. In order to find out what alternative models the students may hold, a second question was put forward in which they were asked to explain what is happening between an object and the eyes when the object is seen.

Both questions were given in written form to a sample of 558 students from the last four grades in the comprehensive school. In addition, an interview with the second question as a point of departure, was carried out with 21 students. On the basis of the data collected in both these ways, we can conclude that the students' thinking about the physical explanation of seeing accords with one of the following qualitatively different alternatives (the set of categories differs somewhat from Andersson and Kärrqvist's original presentation of their results):

A. The link between eyes and object is "taken-for-granted", it is not problematised - "you can simply see". (The necessity of light may be pointed out and an explanation referring to what happens inside the system of sight may be given.)

B. There is a picture going from the object to the eyes. When it reaches them, we see (cf the concept of 'eidola' of the atomists in ancient Greece).

C. There are beams coming out from the eyes. When they hit the object we see (cf Euclide's concept of 'beam of sight')

D. There are beams going back and forth between the eyes and the object. The eyes send out beams which hit the object, return and tell the eyes about it.

E. The object reflects light and when it hits the eyes we can see the object.

No students from grade 6 answered both questions in accordance with alternative (E thus showing a grasp of the key idea of Optics). 11 % did so in grade 9. If we make a a longitudinal conclusion from a cross-sectional study we may say that in at least 11 % of the cases there has been a qualitative change in the students' way of understanding a certain aspect of their physical reality, a change which is, moreover, in accordance with what is taught in school. This change is certainly an outcome of learning and we can safely assume - it seems - that it is an outcome of school learning. Adopting this perspective, the proportion of cases in which one change or another has occurred tells us something about the efficiency of teaching, from this particular point of view.

According to Andersson and Kärrqvist, the textbook authors frequently take the key idea of Optics for granted and in their presentation of the subject they rush to discussing applications such as representation of lenses and system of lenses. Furthermore, as Andersson and Kärrqvist point out

> "It is probably the case that the teacher does not systematically train the students as regards this fundamental understanding, which is so much a part of the teacher's world view that he or she neither thinks of how fundamental it is, nor of that it can be problematic for the students."
> (p 82)

Let us now consider an alternative case and assume that the key idea of Optics is properly stated in the textbook and that it is even pointed out that it is the key idea of Optics. An investigator tries to find out how effective teaching in science is and he or she constructs a test. One of

the questions is "What is the key idea of Optics? It is an open-ended question which the students have to answer in their own words. On the basis of answers given by students in a pilot study judgement, instructions are prepared and after having scored the test it is concluded that 38 % of the students in grade 9 have learnt the key idea of Optics. Such a conclusion would most likely differ from the one that Andersson and Kärrqvist would reach if they replicated their investigation under the hypothetical conditions. The two investigations would answer the question how large a proportion of the students have learnt the key idea of Optics, in two different ways, because the ways of investigating that question reflect and are based upon two different conceptions of learning on the part of the researchers.

CONCEPTIONS OF LEARNING

The difference in this concrete case is an instance of a more general dichotomy -oversimplified as it is- between two distinctively different conceptions of learning. According to one, learning is the acquisition of some facts, definitions etc, according to the other learning is a qualitative change in one's way of understanding some aspect of reality. Obviously, however, we are not referring to <u>any</u> conceivable learning situation, our aim is certainly not to offer a comprehensive definition of learning. We are interested in a certain kind of learning, a kind which is characterised by the learner taking part in some symbolic presentation built on, assuming or dealing with a certain way of apprehending some phenomenon. There are obviously cases in which the acquisition of symbolic form (e.g. the acquisition of vocabulary, formulas etc) or the acquisition of facts (such as Africa's resources of raw material, the functional difference in the pronunciation of the first and the second "e" in "sever" is of interest in itself). In the present context we would like to exclude such cases however.

Were we not to do this, we should have two different conceptions of learning which might refer to two different kinds of learning. The situation on which our interest is focussed, however, is one in which the same instance of learning is conceptualised in two different ways. Now, in cases in which the acquisiton of forms or facts is appropriate, the only thing that can be done is to learn the forms or the facts. On the other hand, there are situations in which one's way of understanding some aspect of reality may be changed by means of taking part in a symbolic presentation. It is such learning situations we have in mind. These can be conceptualised in either of the two ways mentioned above. These two ways of conceptualising learning are intimately linked with (indeed, derived from) two distinctively different conceptions of knowledge; namely knowledge as a collection of right answers on the one hand and knowledge as ways of viewing reality, on the other. Knowledge and learning can thus be found in relation to each other. If we say that learning is gaining knowledge, and if we say that different conceptions (and not only the correct one) of a certain aspect of reality is knowledge, it will follow that learning is a change in one's conception of some aspect of reality. If we were to systematically concentrate our efforts on this form of learning in educational contexts and if we were to describe effectiveness in terms of to what extent such an aim was achieved, it would certainly have very wide implications.

One of the two conceptions of learning (and knowledge) underlies, in actual fact, the line of reasoning in the present paper. In the jargon of phenomenology, we may call it the privileged conception; the researcher's privileged conception, of course. The idea is here to describe learning from the learner's own perspective, to outline the structure of the learner's experience. There is, however, an interplay between our own preconceived ideas of learning and what we observe and discern about others' experience of learning We understand what we see in terms of our ideas but, on

the other hand, our ideas are shaped and modified by our understanding of what we see. The way we characterise the learner's experience of learning has thus to be understood in terms of our conception of learning, which in turn is a result of our analysis of the learner's experience of learning.

THE EXPERIENCE OF LEARNING

A dichotomy, which is aimed at capturing some essential differences in how a learning situation may be experienced, is that between deep and surface approach. The distinction was orginally developed by Marton (1974) on the basis of students' accounts of their experience of learning when reading an article in an individually administrated experiment.
He has also generalised the two categories to relate to the students' normal studies, though with a somewhat different flavour than they had from the beginning. Laurillard (1978) has subsequently used the dichotomy to characterise important differences in the way students of engineering set about problem- solving tasks and also Ramsden (1981) started off with the question of whether or not the deep/surface approach distinction was applicable to various tasks and various academic subjects. He interviewed 57 students studying at six different departments (psychology, engineering, physics, history, english and independent studies) about their way of carrying out and experiencing reading, writing and problem-solving tasks. Both Laurillard and Ramsden asked their subjects to bring with them material used in their recent assignments to the interview situation where they were askedabout their progress in those tasks. Both the method of collection of data and the kind of tasks used differ considerably from Marton's, who used a learning-testing situation with a relatively short article with a social science content as material. This makes the comparisons difficult. Furthermore, while Marton's aim was to describe what it takes to learn by reading, neither Laurillard nor Ramsden aimed primarily at describing

what it takes to learn by solving problems or by writing essays but appeared to try to find out whether the approaches to learning dichotomy could be applied to kinds of learning activities and learning situations other than it was originally designed for.[1] Laurillard and Ramsden were more approach than content-centered in their research, in other words. In table 1, we can see the three lists of subcategories and one way of relating them to each other.

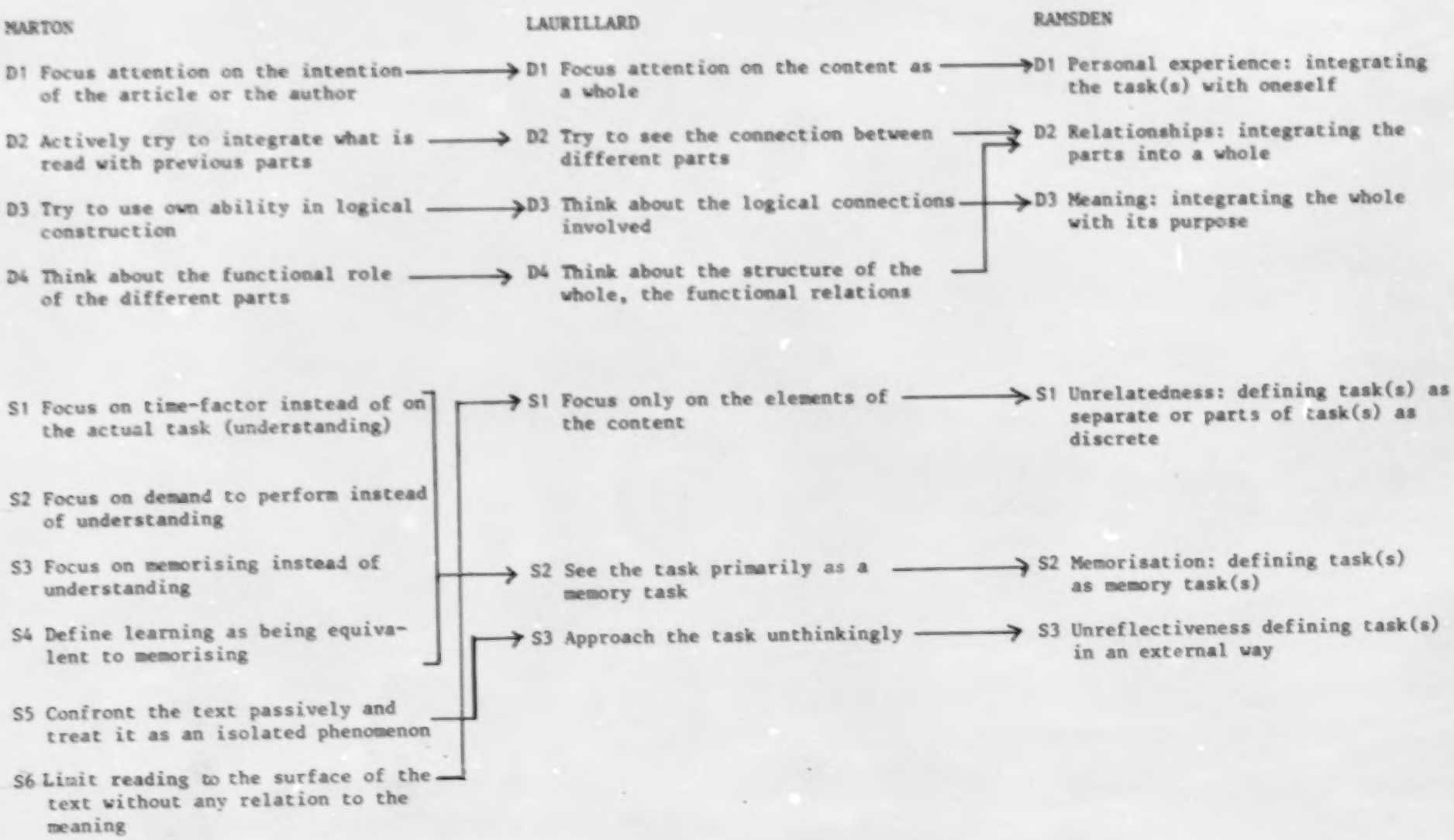

MARTON
LAURILLARD
RAMSDEN
D1 Focus attention on the intention of the article or the author
D1 Focus attention on the content as a whole
D1 Personal experience: integrating the task(s) with oneself
D2 Actively try to integrate what is read with previous parts
D2 Try to see the connection between different parts
D2 Relationships: integrating the parts into a whole
D3 Try to use own ability in logical construction
D3 Think about the logical connections involved
D3 Meaning: integrating the whole with its purpose
D4 Think about the functional role of the different parts
D4 Think about the structure of the whole, the functional relations
S1 Focus on time-factor instead of on the actual task (understanding)
S2 Focus on demand to perform instead of understanding
S3 Focus on memorising instead of understanding
S4 Define learning as being equivalent to memorising
S5 Confront the text passively and treat it as an isolated phenomenon
S6 Limit reading to the surface of the text without any relation to the meaning
S1 Focus only on the elements of the content
S1 Unrelatedness: defining task(s) as separate or parts of task(s) as discrete
S2 See the task primarily as a memory task
S2 Memorisation: defining task(s) as memory task(s)
S3 Approach the task unthinkingly
S3 Unreflectiveness defining task(s) in an external way

Table 1. Approximate relations between subcategories of deep and surface approach.

The basic distinction between deep and surface approach was phrased in terms of the focus of the learner's attention; whether it has the text or what the text is about as its object. Now, what the text is about may certainly vary. In the experimental context from which the distinction originates, the subjects read an article in which the author argued for a certain thesis. Focussing on what the text is about meant, in this special case, focussing on (thinking about, wanting to find out etc) the author's intention (what it was all about, the conclusion, the point of the article etc). If we widen the domain of applicability of the deep/surface dichotomy from reading assignments to problem-solving tasks, as did Laurillard, it means that "text" gains a metaphorical meaning in that even a problem is considered as text. Focussing on what the "text" is about is in this case equivalent to "... keeping the end-point in mind throughout the solution process". Ramsden applied the dichotomy to a wide range of tasks. We will be more restrictive here and reserve the domain of applicability to learning situations in which a "text" presented to the learner can be identified. Due to the variation in the tasks covered, Ramsden's subcategories tend to be more general and one-to-one correspondence between his and Laurillard and Marton's subcategories cannot be easily found. Rather we can pick some of the symptoms from a subcategory and relate them to the subcategories established earlier. The first one of the subcategories of the deep approach includes "the focussing on what the text is about" in the sense of having the phenomenon or the aspect of reality dealt with in the "text" as the object of attention. The phenomenon or the aspect of reality can naturally be either of physical or of social kind depending on the content of the "text".

What we have tried to characterise here is a subcategory of deep approach roughly corresponding to Marton's and Laurillard's first subcategories and certain elements in Ramsden's first subcategory.

Thus, we are not taking the label used by Laurillard for this subcategory at its face value. This first subcategory captures the distinctive feature of the deep approach, which is to have what is signified as the object of attention, to go beyond the text and focus on what it is about.

The deep approach can, however, be expressed in other way as well. In order to go beyond the "sign", it has to be expounded, it has to be understood by means of constructing relations within it (between its parts) or between it (or some of its parts) and something outside it, something which is already known, something similar or something creating a context for understanding. Thus, attempts to expound the "sign" can go on not only "within" or 'between' but also 'beneath'. The learner can for himself reveal the underlying structure of the text, lay free the logic of argument, realise the functional role of the different parts. This category corresponds roughly to Marton's and Laurillard's subcategories 2 and 4 and Ramsden's subcategory 2. Ramsden makes a subtle distinction: in science the parts are related to each other, in social science and arts the parts are related to the whole.

The third subcategory reflects the learner's experience of himself as someone capable of finding out things, drawing his own conclusions, making inferences, checking the logic of the author's line of argument. This reliance on one's own capability to create knowledge is to some extent presupposed by the two previous subcategories. This third subcategory corresponds to Marton's third category and far less clearly to Laurillard's third category and to some of the examples given by Ramsden to illustrate his third subcategory of the deep approach.

In table 2 we can thus see the three subcategories of the deep approach with some different instances under each. The three subcategories are seen as interrelated aspects of the kind of experience of learning we call deep approach. They are thought to be present in each case even

if they are consciously focussed on to various degrees. The instances within each of the subcategories are optional alternatives to each other (though two or more may occur jointly). As the alternative instances very much represent differences in the content of learning, it is reasonable to think that the occurrence of one instance belonging to one subcategory is not unrelated to what instances belonging to other subcategories will occur (e.g. instances belonging to different subcategories but, all related to problem-solving in science, can be expected to occur jointly).

Table 2. Subcategories of the deep approach.

1. Focussing on what the "text" is about (beyond)

   Focussing on the author's intention (what it was all about, the conclusion, the point of the article).
   Keeping the end point in mind throughout the solution process.
   Having the phenomenon or the aspect of reality dealt with in the "text" as the object of attention.

2. Relating

   Relating the parts to each other or to the whole (within)
   Relating some parts of the "text" to something outside it (between)
   Revealing the underlying structure of the text (beneath)

3. Being active

   Finding out things (creative)
   Drawing one's own conclusions, making inferences (logical)
   Checking the logic of the author's line of argument (critical)

The deep approach is one way of experiencing learning and it seems reasonable that the structure of its opposite, the surface approach, offers a mirror image of the structure of the deep approach experience. The core symptom of the latter is the learner's having what the "text" is about, what is signified as the object of his attention. The opposite of this is of course being focussed on the "text", on the sign in itself. One obvious instance of such an orientation is to try to memorise the material instead of trying to understand it. This corresponds rather clearly to Marton's fourth and Laurillard's and Ramsden's second subcategory of sur-

face approach. But what kind of meaning could this category have in the context of problem solving? Ramsden describes science students concentrating only on procedures in performing a task: using formulae, calculations, figures in tackling problems. Though he lumps this instance in under his first subcategory, our judgement is that this focussing on the sign-level in problem-solving corresponds to memorisation in reading assignments. And just as memorisation may occasionally be a neccessary counterpart of studies, so is concentration on procedures

Also Marton's first three subcategories all of which reflect hyper-intention (being too much concentrated on the fulfilment of the demands) mean a focussing on the sign, the "text". The demands experienced refer most often to memorising something, but even if understanding were the aim, hyper-intention would still mean that the learner would fail to break through the "sign-level". Marton's three categories represent three different aspects of the same experience, which are logically related to each other. Because of his awareness of the time limits the learner is afraid of not being able to memorise the material as he is trying to do in order to recall it at the subsequent test of retention. The occurrence of this particular way of experiencing learning was naturally a function of the fact that a retention test following the learning phase was a part of Marton's experiment. Even if this symptom does not appear so strongly in interviews about normal studies, memorisation as a function of the experienced demand structure of the study situation seems to be a most significant feature of the students' existence.

Now, focussing on or remaining at the sign level is not only linked with too high an intensity of effort but also with its opposite. Lack of concentration on the content (in the sense of meaning) of a text may reflect a lack of interest (internal or external) in it. Some of the examples presented

by Marton as instances of his sixth subcategory have a flavour of this symptom.

E.g.

> "I just read it right through without looking back ... I skimmed it so to speak, I didn't read it very carefully"
> (30:1:3) (Marton, 1974, p 54)

And also elsewhere in the literature we find similar examples (cf Fransson, 1977, for instance).

The algorithmic, mechanical way of solving problems in science was sorted into this category of surface approach. What is the alternative way of relating parts to each other or relating parts to the whole? Especially, what does "relating" mean in the context of reading assignment? It is obvious that "relating" in this second (non-algorithmic) sense means relating in terms of the meaning of whatever is going to be related. "Relating" thus implies the learner's going beyond the sign. (And, of course, vice versa. We have pointed out above that understanding is always understanding in relation to something). In the same way, focussing on the sign implies not relating the parts to each other, or to the whole, and not revealing the underlying structure. The second subcategory of the surface approach thus mirrors the second subcategory of the deep approach experience of learning. It deals with the parts in isolation, focussing on details. The "text" is not expounded in any dimension. It remains "flat", thin as it were. We can find it partly in Marton's sixth category and more clearly in Laurillard's and Ramsden's first categories.

The third subcategory of the surface approach mirrors the third subcategory of deep approach and is logically inseparable from the other aspects of the surface-approach experience of learning. Being

focussed on the surface implies treating the parts in isolation, which in turn implies a passive, constrained mind, a learner not taking advantage of his capability of logical thinking and of creating knowledge. Laurillard (1978) made the point that where it is a conscious strategy the surface approach cannot be regarded as a passive orientation. Still, it is passive, we would say, in the sense of the mind not working freely, not being constructive but rather being encapsulated in itself. This category has been based primarily on Marton's fifth and Laurillard's third category. Also, in Ramsden's third category we find examples. Usually, however, the category does not appear in "pure" form and the very same sentence may illustrate two or three subcategories. It is for this reason that the subcategories are not described in order to classifying students' experiences between them. They are described in order to give as clear and detailed a characterisation possible of the two main ways in which learning, of the specific kind we are interested in here, can be experienced.

In table 3, we can see that the three related subcategories of surface approach make up a mirror image of the structure of the deep approach experience of learning. The instances of the first category make up alternatives which are functions of variation in content and context. The three subcategories are seen as three aspects logically related to each other of the relation between the learner and the task. Whether or not they are visible through the learner's subjective account of his experience does, of course, depend on the extent to which they are consciously focussed.

Table 3 Subcategories of the surface approach.

1. Focussing on the "text"

   Try to memorise the material
   Concentrate only on procedures
   Hyperintention (concentrate on time limits, memorising, recall at subsequent test of retention)
   Lack of concentration on content

2. Not relating

   Dealing with the parts in isolation, focussing on details

3. Not reflecting

   Have a passive, constrained mind

We have thus given an outline of a distinction aimed at characterising - what we believe to be - a fundamental difference in how one kind of learning can be,and is,experienced.

Another distinction, arrived at by Svensson (1976) who had a similar aim to Marton, is between a holistic and an atomistic orientation. Though not adopting an experiential perspective, Pask (1976) distinguished between two importantly differing ways of learning: comprehension and operation learning. The deep/surface distinction is one of a referential kind (what is the object attention), holistic/atomistic is one of an organisational kind (how are the parts related to each other) and comprehension/operation is one of a procedural kind (how do the students go about mastering the task).

Now, one would think that these three distinctions conceptually lie in three different dimensions, orthogonal in relation to each other, being independent from each other. This is the point of view taken by Entwistle et al (1979). In their model,both comprehension and

operation learning are considered as necessary prerequisites for a deep approach. This presentation is, however, based on a different line of thought. The idea is to consider how the various distinctions are reflected in actual data when they are applied to normal study situations.

Holistic and atomistic orientation

Svensson (1976) introduced the holistic/atomistic distinction in the following way:

> "The two categories constitute groupings of indications found. As regards the holistic approach during reading, they consist of indications of a general direction towards understanding the text as a whole, a search for the author's intention, relating the content to a larger context and delimiting the main parts of the text. The indications of an atomistic approach were: focussing on specific comparisons in the text focussing on the sequence of the text (not the main parts), memorising of details and direct information about a lack of an orientation towards the message as a whole."
> (p 93)

Judging from this quotation, it seems conceptually and empirically impossible to distinguish the holistic/atomistic dichotomy from the deep/surface distinction. There was another difference between the two pairs of opposites when they were introduced, however, of an epistemological kind. While Marton (1974) described levels of approach and levels of outcome separately and related them to each other subsequently, Svensson had the principle of internal relations as his point of departure. He started with the assumption that process and outcome form a unity and he tried to describe both in such a way that the descriptions would satisfy the relation. The corollary of this position is that the holistic / atomistic distinction can be read either from the qualitative aspects of the performance or from the learner's account of his intention, orientation, way of proceeding. The deep/surface

dichotomy is of the experiential kind, it is aimed at characterising learning from the learner's point of view, at depicting his experienced reality. It can be argued, however, that experience can be expressed both directly, by means of one's account, as indirectly, by means of one's behaviour, visible to others (for this idea in a phenomenological context see Alexandersson, 1981). Viewed in this way, also the deep/surface dichotomy can be reflected in qualities of performance i.e. in what kind of outcome the learner is arriving at. This is, in fact, the position that we have taken by now and also the second way of distinguishing between the two dichotomies is thus ruled out. There is, however, a third possible difference.

We have already pointed to the fact that the deep/surface dichotomy is of a referential kind while the holistic/atomistic distinction is organisational. Usually, however, there is no referential meaning without an organisational meaning and visa versa. In order to understand what the "text" is about we have to integrate its parts, we have to understand it as a whole. And the different parts cannot be integrated unless we have an understanding of what they are referring to. This is why the organisational aspects are represented in the subcategories of the deep/surface dichotomy. There, may be, however, exceptions to the relatedness of organisational and referential meaning. Above all, it is in Gestalt Psychology, where such exceptions would be found. The primordial Gestalt case is a problem, the meaning of which does not lie <u>beyond</u> it but <u>in</u> it. Everything is there, everything is present in the situation in itself and it acquires its meaning by being restructured. In the pure Gestalt case the solution lies in the dimension of the "text". The Gestalt experience may very well be and often is a component of fairly normal reading experiences and it occurs infrequently in pure form. If it does, we may consider it as a limiting case in which the referential meaning is absent. The meaning originates, then, from the

field being restructured, the pattern being seen or the situation being perceived in a qualitatively different way. (Moreover, it occurs as a sudden insight without the learner consciously making "the interpretative work").

Operation and comprehension learning

The third dichotomy aimed at capturing a fundamental difference in the way learning takes place is that of Gordon Pask who distinguishes between operation and comprehension learning. These are characterised by Pask as follows:

> "Left to their own devices, operation learners pick up rules, methods, and details, but are often unaware of how or why they fit together. They have at most a sparse mental picture of the material and their recall of the way they originally learned is guided by arbitrary number schemes or accidental features of the presentation. On the other hand, if an operation learner is provided with a specific description .... he assimilates procedures and builds concepts for isolated topics. His cognitive repertoire includes accessible or effective procedure building operations.
>
> Comprehension learners readily pick up an overall picture of the subject matter ... and recognise clearly where information can be obtained. These individuals are able to build descriptions of topics and to describe the relation between topics. Their cognitive repertoire includes effective, though individually distinctive, description building operations."
> (Pask 1976)

The distinction originates from Pask's characterisation of the serialist and holist strategy, arrived at under strictly controlled experimental conditions (Pask and Scott, 1972). The task that was given in that context was the mastering of the nature of two phantasy species of Martian fauna, the Clobbits and the Glandmullers. The information was presented on cards lying on the table upside down and differences in strategy were reflected in

what questions the subjects asked themselves and which cards they wanted to turn up.

The terminal level of achievement was fixed or frozen in that all the subjects had to go on to complete mastery. This means that any differences in the outcome of learning were eliminated and Pask studied the different ways in which the subjects proceeded. On the basis of this,the subjects could be easily divided into two groups. The serialists were the step-by-step learners and the holists the global learners. The former went from card to card using simple hypotheses while the latter tested hypotheses about complex predicates (Daniel, 1975).

There are two reasons why we cannot include this description arising in an experimental context in the present attempt to integration. Firstly, as was briefly developed above, our line of reasoning is based on the logic of internal relations, we assume outcome and process to form a unit. We do not accept, thus, the idea that qualitatively identical forms of understanding can be arrived at by radically different forms of strategy. Secondly, we have made an attempt earlier to delimit the kind of learning,the experience of which we are dealing with here. Our opinion is that the mastering of the task in Pask's experiment cannot lead to a change in one's understanding of some aspect of reality (which was the critical feature we set up). Being a question of mastering an artificial taxonomic system, it concerns more the acquisition of facts,
lisation of the concepts of operation and comprehension learning in terms of the "spy-ring" test. In this test

> "The subjects are given factual information about a network of spies in three countries, together with rules about the transmission of messages, and the possible changes in the formation of the network. From this background information, and data on the actual sequences of

transmitted messages over three years, it is possible to predict the formation of the spy ring network in the fourth year. In order to make a successful prediction, students have to be able to use both description building and procedure building operations, and the scoring of the test reflects the extent to which they do this."
(Laurillard, 1978, pp 1367)

As the learning task is fairly similar from the structural point of view to Pask's original experiment, our two above objections apply in this case as well. There is, however, a third objection which can be added here. By means of the Spy-ring test we can classify people to what extent they are predominantly operation- or comprehension learners or whether they are versatile (maintaining an appropriate balance between the two). Our aim here is not to describe how people are but in which qualitatively different ways they may experience a certain kind of learning. To what extent a certain form of experience is characteristic of an individual should in our opinion be an empirical question and not an assumption. Anyway, the problem is outside the range of this presentation.

What we are interested in here are categories of description which represent aspects of the experience of various learning assignments in the students' normal study-life. It is to such a use Laurillard aimed at transforming the Paskian categories and therefore we will exclusively build on her work when dealing with Pask's distinction. She used what is called the teachback technique (as introduced by Pask originally). She asked her subjects, who were ten students from the Department of Metallurgy and Materials Technology, appearing at five individual sessions each, to bring notes on topics they were currently working on to the interview sessions. There they were requested to "teach" the experimenter a topic of their choice. The students chose to some extent different topics, but nine of them talked about the interpretation of equilibrium diagrams in metallography on some

and all the interview excerpts used by Laurillard as illustrations

concern this topic. In figure 1, we can see the diagram commented on by the students. One of them is giving an account having the characteristics of operation learning;

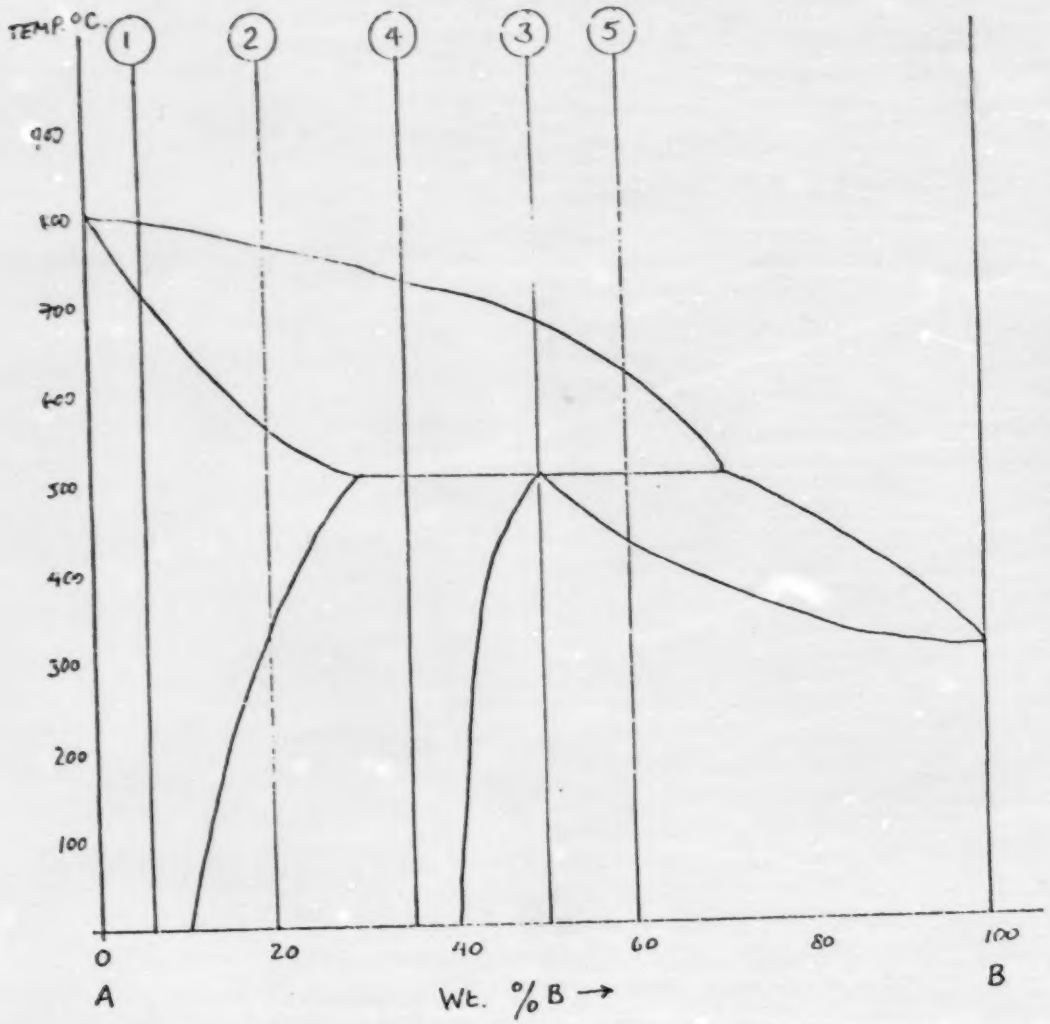


Figure 1. Equilibrium diagram referred to by students (taken from Laurillard, 1978).

"Well basically you find alloy 1 , so you follow that line and youve got temperature up here, you've got element A on this side, element B on this side and there's percentage weights of these along the x axis ... What you have to do is, there's a rule that says that when you go across a solid section of a phase diagram, which is this bottom half, the top half is liquid - you go from single phase to double phase to single phase to double phase, across the bottom of the diagram. The loops here between the solid phase and the liquid phase are compositions of liquid and solid."
(p 146)

Compare this with the following way of talking about the same diagram which is characteristic of comprehension learning.

"Well basically this is an equilibrium diagram taken of an alloy. At one end of the diagram we have pure metal A, where pure metal B is at the other end, so you've got mixtures i.e. alloys between that point in different proportions. These diagrams were made by people who were very dedicated, sitting in little attics and things years ago, by doing cooling curves on certain metals, or alloys, in certain proportions, noting from the liquid phase what happened as the metal cooled down. They would note the temperature at which the solid would start to appear and then the solid would be with the liquid then for a certain temperature range, then at the end of that temperature range, there would be all solid, and that temperature too was noted and it would cool right down to purely solid. Then a lot of these were plotted, all the way across and this would give a graph from all the different points."
(p 147)

The difference between the two accounts is obvious, we believe. What is most striking in our judgement is that while the first account lies <u>in</u> the diagram, as it were, the second goes <u>beyond</u> it. This difference is, however, identical with the main way of distinguishing between the surface and the deep approach. How are then these two dichotomies related to each other? There are at least three obvious differences between the Paskian dichotomy in Laurillard's interpretation and the deep/surface distinction.

1) Firstly, there is a difference as to data source. In Laurillard's case the categories are based on what the students say about the content of learning, in Marton's case on what they say about the process of learning (i.e. on their account of how they set about the learning task).
2) Secondly, there is a difference as to kind of activity and to content. In Laurillard's case, the students try to teach the interpretation of an equilibrium diagram which they have learnt to interpret in metallography, in Marton's study, the students read and tried to learn and understand an article dealing with a recent Swedish University reform.
3) Thirdly, there is a difference as to dimensionality. The category of operation learning in Laurillard's case (and, in fact, theoretically both operation and comprehension learning) introduces a temporal dimension practically absent in the deep/surface dichotomy. When carrying out a partly technical procedure one has to do things in a certian order.

The first question concerning the description of one's experience of learning versus one's description of content has already been discussed above in connection with the comparison between Svensson's and Marton's categories. We concluded that also the outcome of learning, i.e. qualities of performance, may reflect the learner's experience of learning. This applies to Laurillard's data as well, we believe. (We assume here that the way students try to teach back a material learnt previously reflects the way they have learnt it.) In actual fact, the students' way of dealing with the content may provide us with a richer source of data than their own account of their approaches. It is reasonable to believe that there is a variation also within such a category as deep approach and we can possibly do justice to this variation in qualitative terms by using the differences found in the students' handling of the content.

Concerning the second question, about the differences in content, it is obvious that reading an article on an educational problem is one thing and explaining how to interpret an equilibrium diagram is something else. The question is whether the two dichotomies should be distinguished between in terms of differences in content. It could be done of course, if it was the case that one set of categories could be applied to one kind of content and another set to another kind. This does not seem to be the case, however. In actual fact, Laurillard discusses the difference between operation and comprehension learning in terms which closely resemble the distinction between the sign and what is signified (which is the basis for the deep-surface dichotomy).

About operation learning she says:

> "The arguments, statements and reasoning involved are all focused on details of the subject matter - the definitions, rules and procedures that amount to doing the problem."
> (p 150)

And about comprehension learning:

> "Here the students show evidence of thinking about what the rules and definitions refer to, their interpretations and implications. Here they are thinking about what is going on behind the more formal aspects of the subject."
> (loc cit)

Furthermore,she makes a subtle distinction between two forms of comprehension learning "compares or distinguishes theory and practice" and "interpreting theory in terms of, or referring to the real world". In the first case, a comparison is made between theory and reality, the differences, approximations and assumptions are pointed out:

"... the flow of argument has been interrupted to stand back and consider for a moment, the reality it refers to."
(p 151)

In the latter case there is no comparison made, the congruence betwe theory and reality is taken for granted, "... they are considered together, the one being interpreted in terms of the other" (p 152).

Such characterisations of operation v comprehension learning make the distinction indistinguishable from the deep-surface dichotomy. If we agree that both kinds of categories can be based on data which concern students' way of dealing with the subject matter (i.e. we do not restrict the deep/surface distinction to being of an intentional nature) and that both kinds can be applied to the same content, the two models of description seem to collapse into one. This does not necessarily mean that the two distinctions are conceptually or empirically identical in all cases, only that when it concerns the kind of learning that we have delimited in our presentation and in relation to the kinds of content referred to, the two distinctions do not represent distinguishable aspects of the learner's experience (or way of functioning).

The third question above concerned the fact that by means of the notion of operation learning (and, in theory, also of comprehension learning) a temporal dimension is introduced into our description. This is due to the sequential character of the procedural aspect (in actual fact, also hinted at by Svensson (1976) in his description of the atomistic approach mentioned above). It is certainly a distinctive and distinguishing feature, but following the line of argument related to the previous questions we would say that if we apply the idea of surface approach or of operation learning to the actual kind of data, we obtain a picture of fixation on the sign (or on the "text") (which is a characteristic feature of

the surface approach, and a temporally organised sequence of procedures, which is a characteristic feature of operation learning).

Integrating models of description

We have thus found the three different ways of describing differences in the experience of learning discussed above compatible with each other. (Though not intended as such, we consider here Pask's dichotomy as a characterisation of how learning -primarily, its content- can be experienced). As we have used the deep/surface dichotomy as our point of departure, its critical feature appear central in our presentation and critical features of the atomistic/holistic and comprehension/operation learning distinctions appear as complementary. This is not because we believe that the deep/surface distinction is any absolute sense superordinate to the other two. If we had started off with any of the others, the deep/surface dimension would have appeared complementary. As our model of description now stands, we can conclude that when it comes to what Svensson calls atomistic orientation, its characteristic features have already been included in the way in which surface approach is described (especially as regards the second subcategory above). This is probably, at least in part, due to the fact that both Laurillard and Ramsden may have been influenced by Svensson's original presentation when using the notions of deep and surface approach.
The way Svensson (forthcoming) presents holistic orientation, currently namely more clearly in the Gestalt sense, adds a dimension to our above system of description. It is what we would call the dimension of structural meaning, referring to the case when the qualitatively new way of understanding achieved by the learner does not mean going beyond what is presented, but by means of a sudden restructuring of the field, seeing what is presented in itself in a new say[2].

As we pointed out above,the characteristics of comprehension learning seem to coincide with those of the deep approach. Laurillard's distinction between "compares or distinguishes theory and practice" and "interprets theory in terms of, or referring to, the real world" offers in some instances a further refinement of the first subcategory of the deep approach[3].

The notion of operation learning,as it turns out in Laurillard's application, is,in fact,already included in the first subcategory of the surface approach above. This is due to Ramsdens application of the deep/surface dichotomy to problem-solving. In his case,operation learning becomes empirically inseparable from the surface approach. Anyway, just as is the case with Svensson's holistic understanding, operation learning as it appears here as an instance of the surface approach; "concentrating only on procedures", adds a dimension to the previous model of description. This dimension is the dimension of temporality.

We have thoroughly stressed the fact that we are only dealing with a special - though common - kind of learning, namely the kind of learning that takes place when we are supposed to gain knowledge about the world by means of symbolic presentation. This form of learning is one of the cornerstones on which our civilisation is built and it dominates the entire educational system. Our description of the experience of learning revolves around the distinction between reality and its representation, or - reversing the contrast - between the sign (the "text") and the signified. One main way of experiencing this kind of learning is - as we have pointed out several times - seeing the sign, focussing on the "text", and the other way is experiencing the sign as transparent and seeing the reality it refers to, as it were. This dichotomy is related to other pairs of opposites such as form v content, the idea v its realisation, thinking v doing. What seems most central here is the relation between the meaning and its more or less

arbitrary carrier. Acquiring a certain meaning of a concept, principle, procedure etc, would theoretically enable us to deal with an unlimited variation in situations in which this meaning is actualised, or with an unlimited number of forms in which it is expressed. "Learning" the specific way in which this meaning is realised restricts us to that specific realisation. This does not imply by any means, that we think that students never have to focus on the sign, never have to concentrate on facts, details, procedures. It is perfectly clear that learning of the surface approach kind is -to varying degrees - a necessary component of academic studies in various fields. What we are interested in here, however, are - as we said above - all those cases in which either of the two approaches can be adopted and where the deep approach is preferable (at least according to our own conception of learning).

Here, we have been aiming at outlining a structure of the experience of learning. The two main ways of experiencing learning make up mirror images of each other, in both there are three logically interrelated subcategories (with a number of qualitatively different kinds of instances) which make up opposites of the corresponding alternative subcategories[4]. Each set of three related subcategories represents three different aspects of the same experience. In one case, reality is in focus, the understanding of which is arrived at by relating parts of the text to each other and to that which is already known, the text is expounded, it "grows" in different dimensions, it gets filled with meaning and the learner experiences himself as an active agent, a creator of knowledge. In the other case, the "text" is focussed on, it remains flat, thin, isolated and the learner experiences himself as a passive recipient of what is on the pages. The three experienced components are thus: firstly that which the learner's intentionality projects itself towards (the end), secondly, the "text" which the learner is dealing with (the means) and thirdly the learner

himself. All three components are necessary aspects of the learning experience but they may be consciously attended to various degrees. For this reason, one of the subcategories (the first one) is identical with the critical feature of the superordinate category. As the three subcategories are logically related to each other, either of them represents the others as well as it represents the total structure of the learning experience. Here, we have to distinguish between the researcher's and the learner's perspective. What the learner is conscious of and is telling us can be interpreted as subcategory 1,2 or 3. In the researcher's perspective these, however, form a unity and thus indicate the same superordinate category.

THE LEARNER'S CONCEPTION OF LEARNING

There is another important difference between what we call the learner's versus the researcher's perspective. The original characterisation of the deep and surface approach was based on students' account of their experience of the learning situation, in which they gave that account. What we characterised was their lived experience. What the researcher brings into the analysis is his conceptualisation of learning. We pointed out above that it is not the case that this conceptualisation was there prior to the analysis of the data about the experience of learning. Quite the contrary, the conceptualisation grew out of these data. But nevertheless the conceptualisation on the superindividual level represents an abstract dimension of possibilities usually not visible from the learner's point of view (especially not as regards the structural properties of this conceptualisation).

In actual fact, also the learners' conceptualisation of learning has been the object of investigation. In addition to the analysis of the students' accounts of, and in a concrete learning situation, Marton (1974) reports on

an interview study concerning learning in normal studies. He found that the notions of deep and surface approach were applicable there too, though their flavour differed somewhat from the original meanings given, as was pointed out above. The three subcategories of deep approach were found by and large in the same form as described above. But there was an another, fourth category which Marton called "personal knowledge". It referred to the conceptualisation of learning according to which learning is a process in which knowledge is made a part of oneself, it is the acquisition of (or a change in) an interpretative framework in terms of which the world around can be understood in a new and different way.

Also Ramsden (1981) ran an interview study about students' normal studies (see above). Though he says that he followed Laurillard's methodology and asked the students to bring with them to the interview a problem sheet or a piece of reading material on which they were currently working, there is an important difference. While Laurillard used the "teachback" technique and asked them to explain something for her, like the interpretation of equilibrium diagram in the above example, Ramsden asked questions mainly about the process (and not so much about the content) of studying (e.g. he asked questions like "How did you go about it? Why are you reading it? Were you looking out for anything particular? Did you do it differently from another task of the same sort? Why?", Ramsden, ibid, p 133). This means that while Laurillard's subjects phrased their answers mainly in terms of content, Ramsden's subjects to a larger extent than Laurillard's phrased their answers in psychological terms. As the questions Ramsden asked were fairly similar to Marton's questions, it is hardly surprising we find that his first subcategory of the deep approach not only is called "personal experience" but also includes elements of what Marton calls "personal knowledge". One of the examples he offers, is prototypical

"...I think it adds so much ... to my life, to be able to perceive what happens in everyday society through the eyes of a sociologist or of a psychologist, and put a structure on what's going on." (Ramsden, ibid, p 151)

As we discussed earlier, the distinction between conceptualisation and experience is not entirely clear-cut, but basically the former refers to the result of the process of abstraction, to the fact that we may have a generalised idea of something which we knew from our experience of its innumerable instances. Experience, on the other hand, is something concrete, something lived. It is linked with a particular situation and a particular content. Seen from this angle, both Marton's and Ramsden's interviews about normal studies represent something in between the study of experiences and the study of conceptualisations. Even if the students are not discussing their experience in the very same situation in which they are, they are trying to sum up and refer to a number of concrete experiences of studying.

Säljö (1979) ran a more straightforward study of people's conceptions of learning, by asking them in general. His analysis resulted in five distinctively different categories: learning as

1. ... a quantitative increase in knowledge
2. ... memorising
3. ... the acquisition of facts, methods, etc which can be retained and used when necessary
4. ... the abstraction of meaning
5. ... as an interpretative process aimed at understanding reality

In accordance with Säljö's own judgement, we think that the main dividing line goes between the first three and the last two conceptions. The fifth of the conceptions listed seems similar or identical to the "personal

knowledge" notion of learning. The fourth conception seems to have a logical relation to it: in order to change our understanding of some aspects of reality by means of taking part of some symbolic presentation we have, of course, to extract meaning from that presentation. These two conceptions thus stand in a similar kind of implicatory relationship to each other as do the subcategories of deep and surface approach respectively in relation to each other.

Similarly, the three first conceptions listed form a structure within which they are related to each other by implication. In order to more or less algorithmically apply previously acquired facts or methods, one has to have memorised them first. To see learning as memorisation implies that learning is conceived of as an accommodation of more or less independent pieces of knowledge. The conception of learning as memorisation can also be found in both Marton's and in Ramsden's studies.

We have thus two main ways of conceptualising learning; according to the first, learning is a change in our way of understanding some aspect of reality, according to the second, learning is to memorise something, to acquire some facts or procedures. These two main kinds of conceptions correspond fairly well to the two main ways of experiencing learning, the deep and the surface approach. We would say that one is linked with the deep approach experience of learning and the other with its opposite (the surface approach). And of course, we cannot change our understanding of some aspect of reality unless we - in learning - direct our attention to reality and we cannot but conceptualise learning as memorisation if it is memorisation which we do in all learning situations.

Furthermore, the two conceptions discerned on the basis of what the learners say are identical with the two different conceptions presented at

the beginning of this paper, introduced as alternative conceptions of learning which the researchers may hold and of which one was laid as a basis for the whole chapter. And,indeed, the conceptions available to the learner and the researcher (or teacher) are the same, In actual fact,as it was said previously, the very distinction presented at the beginning of the paper is one that is a result of many years'analysis of learner accounts.

Just as the two main ways of experiencing learning could be expressed either by the learner's account(i.e. by means of words) or by the learner's way of dealing with the subject matter (i.e. by means of deeds), the two main conceptions of learning can be expressed either by means of declarations or by means of acts. As regards the learner, when identifying the above subcategory "personal knowledge " Marton (ibid) used as an indication the fact that,for instance, students of Education spontaneously used concepts and theories they have confronted in their studies when giving their point of view of studying at university.

In passing,we can note the difference in relation to the introductory section of this chapter. There we discussed conceptions of learning exhibited by researchers (teachers) in terms of the kind of questions they asked. Oversimplifying it somewhat,researchers (teachers) may express their conceptions of learning by means of what (how) they ask and students may express their conceptions of learning by means of what (how) they answer.

In Marton's case with the subcategory "personal knowledge",some students expressed by their way of answering questions a "change-of-way-of-seeing" conception of learning. Dahlgren (1978) gives example of the reverse, namely students expressing a "memorising-what-is-in-the-book" conception of learning by their way of answering questions. He held individual in-depth interviews with a group of university students both at the beginning and at the end of

an academic term during which they studied Economics. He asked them about some fundamental economic concepts such as price, elasticity of price, devaluation etc in a non-technical everyday fashion. It turned out that in spite of successful examination performance, they had not changed on the level of everyday conception though there were changes on the word level; at the end of the term, they expressed the same conception that they had had even before they started their studies, but this time in the more sophisticated jargon of Economics.

One would naturally expect a reasonably high degree of correspondence between what people say that they think learning is and what kind of learning they manifest. This was demonstrated in a persuasive way by SÄLJÖ (1982) through an intriging analysis. He showed that subjects holding a "flat", memorisation conception of learning tried to memorise facts, details when reading a text for subsequent recall, while parts of the text aiming at introducing new ways of seeing something were regarded as not being "something to be learnt". And of course an often unrecognised condition of achieving "good results" is that the one whose performance is going to be described holds a notion of learning which is compatible with the notion held by the one who is going to describe. SÄLJÖ was looking for whether his subjects reached a new understanding of that they were reading about, whether they had changed their conceptions. But these subjects seemed simply to lack the cognitive category of "conception" and they failed to learn in our sense of learning.

This is why the characterisation of the structure of the experience of learning was preceded by the outline of two possible conceptions which the researchers (teachers) may hold and it was followed by the outline of two possible conceptions which the learner may hold (and which were found to be identical with the set of conceptions available to the researchers (teachers).

When we want to find out something about learning, what we possibly can find out depends on our model of description and what the learner learns depends on his/her conception of learning (which is assumed to affect his way of functioning, his way of experiencing the actual learning situation[5]).
On the other hand, the students' idea of learning is -at least partly - shaped by how learning is defined for them by the educational system they belong to. If we want the learner to adopt a certain conception of learning we had better adopt it ourselves (and act accordingly).

In connection with the introductory example, we mentioned that what has been called the key idea of Optics is frequently taken for granted both by text-book writers and by teachers. In general, the kind of learning we are advocating here, i.e. which means a transition from one way of understanding some aspect of our reality to a qualitatively different one, is as fundamental as it is invisible. And it is fundamental and invisible for exactly the same reason; our way of understanding is surely a part of us.

This kind of learning means radical changes in the learners. If we believe that the aim of education is to qualitatively change and improve the participants' way of apprehending their reality we should judge and promote learning in accordance with this aim. Radical changes in thinking due to learning certainly presuppose radical changes in thinking about learning.

N o t e s

1. I am grateful to Dai Hounsell who, in a personal communication, drew my attention to this aspect of Laurillard's and Ramsden's work.

2. This means that we may add an instance to the subcategory "Relating" in table 2 above, such as

   "Attending the whole, grasping its structural meaning".

3. We may thus add to the third instance under the subcategory "Focussing on what the "text" is about the following:

   "(e.g."compares or distinguishes theory and practice" respectively "interprets theory in terms of, or referring to, the real world")"

4. We have in different places referred to the question of the relations between categories of description. These relation are of different kinds. Intruding into the domain of logic and misusing its terminology we can very tentatively discern the following typology:

   A. Definitory relationship
   "Knowledge" and "learning" are, for instance, defined in relation to each other.

   B. Implicatory relationship
   There are such relations between, for instance, the three sub-categories of deep and surface approach respectively (table 3), between the three components of hyper-intention, between the first three and the last two conceptions respectively in Säljö's characterisation of qualitatively different ideas about learning. These relations exist as a result of the underlying structure of our language, our thinking, our common sense. An activity (e.g. focussing) presupposes (implies) both an agent (who is focussing) and an object (that which is focussed on), for instance.

   C. Mutually excluding alternatives (opposites)
   The corresponding subcategories of deep and surface approach respectively (tables 2 and 3) constitute alternatives to each other. They cannot occur simultaneously, they are each other's negations.

D. Logically independent alternatives

The occurrence of the instances listed under the various subcategories in tables 2 and 3 is a function of the content and context of learning. They may or may not appear at the same time.

E. Dimensional relations

In connection with our discussion of "operation learning", we mentioned that this notion adds a temporal dimension to our previous model of description. To the extent various categories of dimension lie in different dimension, we can speak dimensional independence between them.

F. Super- and subordinate relations

The relation between subcategories of deep and surface approach and instances classified under them, for instance, can be seen as a relation between different levels of abstraction. By being more abstract, subcategories are in a sense superordinate to instances.

G. Logical-empirical relationships

This kind of relationship has only been dealt with here indirectly. As an example we can think of the hyper-intention (symptom of surface approach. It is defined as a very strong orientation towards the fulfilment of some (usually external) demands. The super-intention categories are thus logically (and inseparably) related to (external) demands. The demands can, however, be manipulated, thus make up an independent variable in the educational setting. The logically related categories, thus, do not neccessarily constitute a closed system. On the contrary, on the basis of the logical relationships we can to some extent predict the effects of our measures.

Recently,Marton (1981) advocated a new domain of inquiry which he called phenomenography. Its substance would be all the possible categories of description which denote the qualitatively different ways in which various aspects of our reality can be experienced and conceptualised. One of the major aims of the discipline of phenomenography would be to collect such categories of description and to clarify the relationships between them. In this sense,the present paper may be regarded as a first step towards a "Phenomenography of learning". A next step would be, of course, to use the relations listed here in a more systematic fashion.

5. Above,we referred to the relation between conceptions and experience (see note 4). We then dealt with a relation as a logical one, conceptions are superordinate in relation to experiences. We can also express it so that a certain way of experiencing a situation or a certain way of functioning in it reflects (or implies) a certain conception. If we look at the same relation from the other direction,we see a causal coupling; what kind of conception we hold effects what we experience or how we function. The latter,can however,be effected by other factors as well, conception is certainly not a sufficient basis for action.

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